Magneto Resistive Elements (MR Elements)

Type: EZMP

Panasonic MR Sensor is a magnetic sensor in which magneto resistive element is used with a magnet rotator / scale, pre-magnetized at an accuracy pitch of 0.1 mm to 1.0 mm. With this combination, a highly accurate control can be realized and can be used for various applications.

Features

- Flat sensing surface
  (Precise and easy to assemble)
- Short turn around-time by standardized pitch and shape.
- High speed and accuracy control possible
- RoHS compliant

Recommended Applications

- Capstan motors (Rotation speed)
- Camera lens unit (Position)
- Printers (Printing timing)
- Counter (Number of rotations)
- Disc drive actuator (Position)

Explanation of Part Numbers

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Z</td>
<td>M</td>
<td>P</td>
<td>D</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Product Code**
  - E: Magneto Resistive Elements
  - Z: Single
  - M: 90° phase double
  - P: 180° phase double

- **Function**
  - D: Biased
  - H: Non-biased
  - R: High sensitivity
  - Z: Super high sensitivity

- **Design No.**
  - 01

- **MR Sensitivity**
  - N: Biased
  - P: Non-biased
  - H: Non-biased
  - M: Super high sensitivity

- **Shape**
  - S: Design No.

Construction

- Bracket
- Bias Magnet
- Molded MR Coreblock
- Sensing Element
### Performance Specifications, Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance Value</td>
<td>1 kΩ (standard) ±30%</td>
</tr>
<tr>
<td>Sensing Range</td>
<td>1600 A/m to 16000 A/m</td>
</tr>
<tr>
<td>Pitch Density</td>
<td>0.1 mm min.</td>
</tr>
<tr>
<td>Category Temperature Range</td>
<td>−30 °C to +70 °C</td>
</tr>
<tr>
<td>Applied Voltage</td>
<td>5 V (standard)</td>
</tr>
<tr>
<td>Resistance Change by Magnetic Force</td>
<td>N: 3 % min. (at ±16000 A/m)</td>
</tr>
<tr>
<td></td>
<td>P: 2 % min. (at ±16000 A/m)</td>
</tr>
<tr>
<td></td>
<td>M: 6 % min. (at ±16000 A/m)</td>
</tr>
<tr>
<td>Resistance Pair-Matching</td>
<td>$\frac{R_{A} + R_{B}}{2} = (50±0.6)%$</td>
</tr>
</tbody>
</table>
Packaging Methods

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Standard Quantity</th>
<th>Style</th>
<th>Mass (Weight) [g/pc.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZMP□□□□□01</td>
<td>3,600 pcs./Box</td>
<td>Tray</td>
<td>0.58</td>
</tr>
<tr>
<td>EZMP□□□□□SA</td>
<td>15,000 pcs./Box</td>
<td>Tray</td>
<td>0.12</td>
</tr>
<tr>
<td>EZMP□□□□□S8</td>
<td>15,000 pcs./Box</td>
<td>Tray</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Application Examples

1. Detection of rotations
   (1) Detection of position
      EZM detects the magnetized spot on a rotator.

2. Detection of rotation angle
   The circumference of a rotator has been magnetized as shown in the figure on the right.
   EZM detects a rotation angle by analyzing wave forms.

3. Detection of number of rotations.

Examples of Applications

- To sense movement without contact
- To sense weak signals that a Hall Sensor can’t do
- Can sense more precisely accurately than a Hall Sensor
- To get more stabilized output voltage from ring head
- To substitute for optical sensor in dusty environment
- To sense at a higher speed than an optical sensor
- To sense at a higher speed or a higher accuracy than a stepping motor

Safety Precautions

The following are precautions for individual products. Please also refer to the common precautions for MR Sensors in this catalog.

1. Solder Magneto Resistive Elements (hereafter called the MR Elements) at their terminal tips at 260 °C or lower for no more than 10 seconds.
2. Do not apply excessive shock, such as a drop impact, to the MR Elements’ bodies or terminals.
3. Do not use any corrosive adhesives, such as those made of acid, alkali, or base, or any adhesives that apply stress to the MR Elements.
4. Do not wash the MR Elements with organic solvents.
**MR Elements Inquiry Work Sheet**

Please fill out the following items and send with your request.

<table>
<thead>
<tr>
<th>Your name</th>
</tr>
</thead>
</table>

Please give your address and phone number to our sales staff.

|---------------|-------------------|-----------------------------|----------------|---------------------|-------------|--------|--------------|------------|

<table>
<thead>
<tr>
<th>Application Set.</th>
<th>1) VCR</th>
<th>2) Camera</th>
<th>3) Motor</th>
<th>4) Water-flow-meter</th>
<th>5) Other (   )</th>
</tr>
</thead>
</table>

**Projected Quantity** Projected Qty. 

<table>
<thead>
<tr>
<th>Manufacturing Schedule</th>
<th>E.S.</th>
<th>P.P.</th>
<th>M.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering sample</td>
<td>Pilot production</td>
<td>Mass production</td>
<td></td>
</tr>
</tbody>
</table>

**Detecting (FINE) Pitch** 

_______ µm or _______ mm

**Sample Required** EZM __________ x __________ pcs.

**Additional Comments:**

**Questions:**

If you couldn't use MR elements, What’s alternative?

1) Hall Element/IC 2) Magnetic head 3) Coil 4) Coil pattern

5) Optical sensor 6) Eddy current 7) Other (   )

We appreciate your input. Thank you.
Safety Precautions (Common precautions for MR Sensors)

- When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate its operations when installed in your products.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other significant damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.
  * Systems equipped with a protection circuit and a protection device
  * Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general electronic equipment (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment).
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
  1. In liquid, such as water, oil, chemicals, or organic solvent
  2. In direct sunlight, outdoors, or in severe dust condition
  3. In salty air or air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
  4. Electric Static Discharge (ESD) Environment
     - These components are sensitive to static electricity and can be damaged under static shock (ESD).
     - Please take measures to avoid any of these environments.
     - Small components are more sensitive to ESD environment.
  5. Electromagnetic Environment
     - Avoid any environment where strong electromagnetic waves exist.
  6. In an environment where these products cause dew condensation
  7. Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin or other materials
- These products generate Joule heat when energized. Carefully position these products so that their heat will not affect the other components.
- Carefully position these products so that their temperatures will not exceed the category temperature range due to the effects of neighboring heat-generating components. Do not mount or place heat-generating components or inflammables, such as vinyl-coated wires, near these products.
- Note that non-cleaning solder, halogen-based highly active flux, or water-soluble flux may deteriorate the performance or reliability of the products.
- Carefully select a flux cleaning agent for use after soldering. An unsuitable agent may deteriorate the performance or reliability. In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues. Otherwise, the insulation performance may be deteriorated.

(2) Precautions for storage

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 5 °C to 35 °C and a relative humidity of 45 % to 85 %.

The performance of Chip MR is guaranteed for 3 months after our delivery, provided that they are stored at a temperature of 5 °C to 35 °C and a relative humidity of 45 % to 85 %.

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.
  1. In salty air or in air with a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂
  2. In direct sunlight

<Package markings>

Package markings include the product number, quantity, and country of origin. In principle, the country of origin should be indicated in English.

May. 2015
Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.

- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.

- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.

- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.

- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.

- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.

- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.